GLITCH DETECTOR, ELECTRONIC DEVICE HAVING THE SAME, AND ALARM SIGNAL GENERATION METHOD THEREOF

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from Korean Patent Application No. 10-2015-0108166 filed on Jul. 30, 2015, the entire contents of which are hereby incorporated by reference.

BACKGROUND

[0002] Apparatuses and methods consistent with exemplary embodiments relate to a glitch detector, an electronic device having the same, and a method of generating an alarm signal.

[0003] A glitch attack technique is an attack that hacks a smart card by applying an abnormal signal to a power signal or an externally provided signal such that the smart card unpredictably operates. For example, a glitch is applied to an operating voltage for driving a chip in a smart card to steal data from an electrically erasable programmable read only memory (EEPROM). Accordingly, a smart card may include a glitch detector which detects a sudden increase or decrease in a voltage.

SUMMARY

[0004] Exemplary embodiments provide a glitch detector, an electronic device including the glitch detector, and a method of generating an alarm signal.

[0005] According to an aspect of an exemplary embodiment, there is provided a glitch detector including a clock generator configured to generate a clock corresponding to a power voltage; a counter configured to count the clock generated by the clock generator and to output a count value; and a comparator configured to compare a reference value with the count value output by the counter and to generate an alarm signal based on a result of the comparison.

[0006] The clock generator may include a ring oscillator.

[0007] The counter may include a ripple counter.

[0008] The glitch detector may further include a synchronizer configured to synchronize the count value with a system clock that is different from the clock generated by the clock generator.

[0009] The count value output from the counter may be a binary code value, and the glitch detector may further include a binary gray code converter configured to convert the binary code value into a gray code value and to output the converted gray code value to the synchronizer, the synchronizer synchronizing the converted gray code value with the system clock, and a gray binary code converter configured to convert the synchronized gray code value into a binary code value and to output the converted binary code value to the comparator.

[0010] The glitch detector may further include a reference value generator configured to generate the reference value.

[0011] The reference value may be a fixed value.

[0012] The reference value may be a variable value.

[0013] The reference value may be a moving average value.

[0014] The comparator may generate the alarm signal when an absolute value of the count value minus the moving average value is greater than a threshold value.

[0015] The comparator may generate the alarm signal when the count value is greater than the moving average value, and the count value is greater than an upper limit, or the comparator may generate the alarm signal when the count value is not greater than the moving average value, and the count value is less than a lower limit.

[0016] The reference value may be a prior count value, wherein the comparator generates the alarm signal when an absolute value of the count value minus the prior count value is greater than a threshold value.

[0017] The comparator may generate the alarm signal when the count value is greater than an upper limit, or the comparator may generate the alarm signal when the count value is not greater than the upper limit, and the count value is less than a lower limit.

[0018] In a counting section of a system clock domain, the clock generator may generate the clock, and the counter may count the clock, and in a transferring section of the system clock domain, the clock generator may not generate the clock, and the counter may output the count value to the comparator.

[0019] According to an aspect of another exemplary embodiment, there is provided an electronic device including at least one central processing unit; and a glitch detector configured to generate a clock corresponding to a power voltage, to count the clock to generate a count value, to compare a reference value with the count value, to generate an alarm signal based on a result of the comparison, and to output the alarm signal to the at least one central processing unit.

[0020] The at least one central processing unit may perform a reset operation in response to the alarm signal.

[0021] The reference value may be generated in the glitch detector.

[0022] The reference value may be generated in the at least one central processing unit.

[0023] The reference value may include an upper limit and a lower limit, and wherein the at least one central processing unit changes the upper limit and the lower limit such that a sensitivity of the glitch detector is adjusted.

[0024] The glitch detector may be activated or deactivated according to a management policy of the electronic device.

[0025] According to an aspect of another exemplary embodiment, there is provided an alarm signal generating method of a glitch detector, the method including generating a clock corresponding to a power voltage; counting the clock to generate a count value; comparing a reference value with the count value; and generating an alarm signal based on the comparison result.

[0026] The comparing of the reference value may include determining whether an absolute value of the count value minus the reference value is greater than a threshold value; or determining whether the count value is greater than an upper limit; or determining whether the count value is smaller than a lower limit.

[0027] The reference value may be a moving average value, and the comparing of the reference value may include determining whether an absolute value of the count value minus the moving average value is greater than a threshold value.

[0028] The reference value may be a moving average value, and the comparing of the reference value may include determining whether the count value is greater than the moving average value; when the count value is greater than